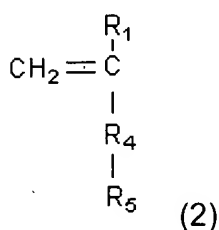
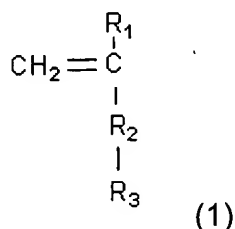


# **WHAT IS CLAIMED IS:**

1. A monomer for a chemically amplified negative photoresist, which is represented by the formula 1 or 2:

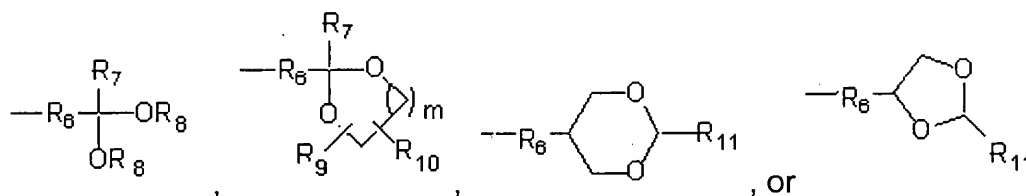


wherein:

R<sub>1</sub> is H or CH<sub>3</sub>;

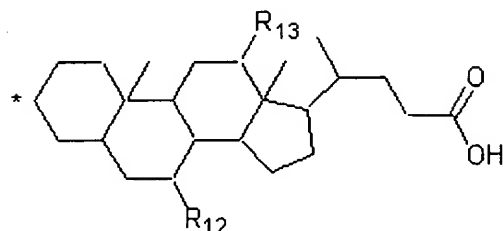
R<sub>2</sub> and R<sub>4</sub> are each independently selected from (R)<sub>α</sub>(CH<sub>2</sub>)<sub>β</sub>R' and (R)<sub>α</sub>[(CH<sub>2</sub>)<sub>γ</sub>O]<sub>δ</sub>R' (wherein R is CO, CO<sub>2</sub>, O, OCO, or OCO<sub>2</sub>, R' is O, CO<sub>2</sub>, or OCO<sub>2</sub>, α is 0 or 1, β is 0 to 5, γ is 1 or 2, and δ is 1 to 5);

R<sub>3</sub> is represented by one of the formula:



wherein R<sub>6</sub>, which combines an acetal compound and a vinyl compound, is a C<sub>1</sub>-C<sub>5</sub> saturated alkyl, a C<sub>1</sub>-C<sub>5</sub> ether, or a C<sub>1</sub>-C<sub>5</sub> carbonyl; R<sub>3</sub> to R<sub>7</sub> are each independently selected from H, C<sub>1</sub>-C<sub>5</sub> saturated alkyls, C<sub>1</sub>-C<sub>5</sub> ethers, C<sub>1</sub>-C<sub>5</sub> carbonyl groups, and C<sub>1</sub>-C<sub>5</sub> alcohol groups; and m is a number ranging from 1-5; and

R<sub>5</sub> is represented by the formula:



wherein R<sub>12</sub> and R<sub>13</sub> are identical or each independently H or OH; and

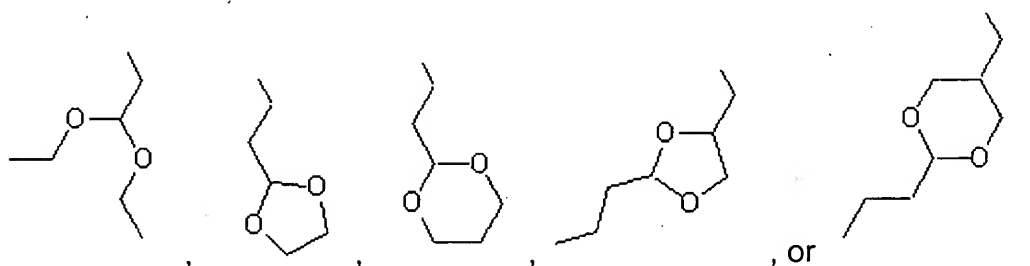
\* represents the bonding site at which the R<sub>4</sub> group is bonded.

2. The monomer for a chemically amplified negative photoresist according to claim 1 wherein:

R<sub>1</sub> is H;

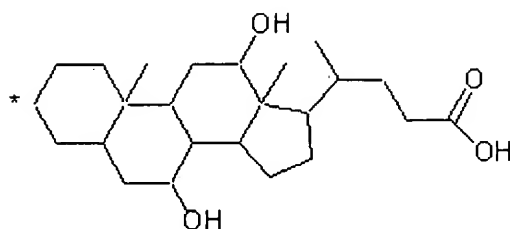
R<sub>2</sub> is CO<sub>2</sub>;

R<sub>3</sub> is

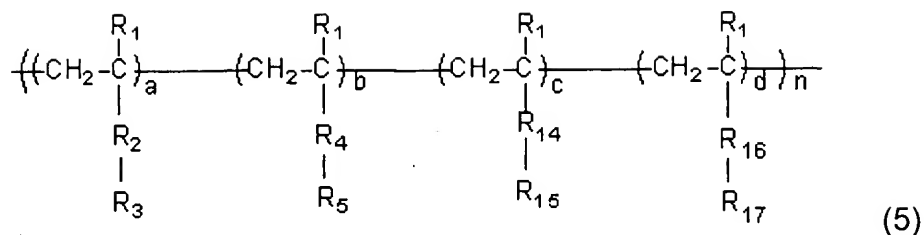


R<sub>4</sub> is CO<sub>2</sub>; and

R<sub>5</sub> is



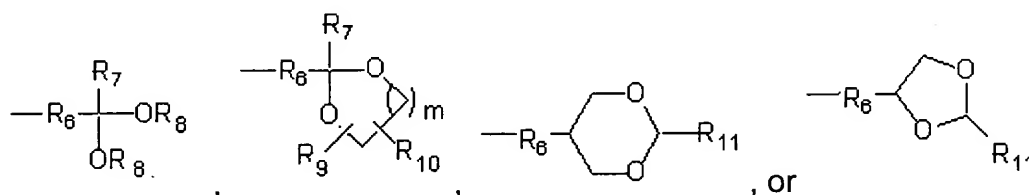
3. A polymer for a chemically amplified negative photoresist, which is represented by formula 5:



wherein  $\text{R}_1$  is H or  $\text{CH}_3$ ;

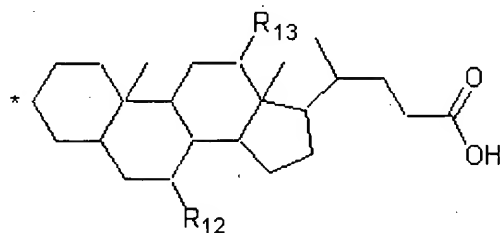
$\text{R}_2$  and  $\text{R}_4$  are each independently selected from  $(\text{R})_\alpha(\text{CH}_2)_\beta\text{R}'$  and  $(\text{R})_\alpha[(\text{CH}_2)_\gamma\text{O}]_\delta\text{R}'$  (wherein, R is CO,  $\text{CO}_2$ , O, OCO, or  $\text{OCO}_2$ ,  $\text{R}'$  is O,  $\text{CO}_2$ , or  $\text{OCO}_2$ ,  $\alpha$  is 0 or 1,  $\beta$  is 0 to 5,  $\gamma$  is 1 or 2, and  $\delta$  is 1 to 5);

$\text{R}_3$  is represented by one of the formula:



wherein  $\text{R}_6$ , which combines an acetal compound and a vinyl compound, is a  $\text{C}_1$ - $\text{C}_5$  saturated alkyl, a  $\text{C}_1$ - $\text{C}_5$  ether, or a  $\text{C}_1$ - $\text{C}_5$  carbonyl;  $\text{R}_7$  to  $\text{R}_{11}$  are each independently selected from H,  $\text{C}_1$ - $\text{C}_5$  saturated alkyls,  $\text{C}_1$ - $\text{C}_5$  ethers,  $\text{C}_1$ - $\text{C}_5$  carbonyl groups,  $\text{C}_1$ - $\text{C}_5$  alcohol groups; and  $m$  is a number ranging from 1-5; and

$\text{R}_5$  is represented by formula:



wherein  $\text{R}_{12}$  and  $\text{R}_{13}$  are each independently selected from H and OH,

and

\* represents the bonding site at which the  $\text{R}_4$  group is bonded;

R<sub>14</sub> and R<sub>16</sub> are each independently selected from a single bond, (R)<sub>α</sub>(CH<sub>2</sub>)<sub>β</sub>R', and (R)<sub>α</sub>[(CH<sub>2</sub>)<sub>γ</sub> O]<sub>δ</sub>R' (wherein R is CO, CO<sub>2</sub>, O, OCO, or OCO<sub>2</sub>, R' is O, CO<sub>2</sub>, or OCO<sub>2</sub>, α is 0 or 1, β is 0 to 5, γ is 1 or 2, and δ is 1 to 5); R<sub>15</sub> is a hydroxyl group; R<sub>17</sub> is a carboxyl group;

a, b, c, and d represent mole ratios of each monomer, a has a value of 0-0.5, b has a value of 0-0.9, c has a value of 0-0.3, and d has a value of 0-0.3, provided that a+b+c+d = 1; and

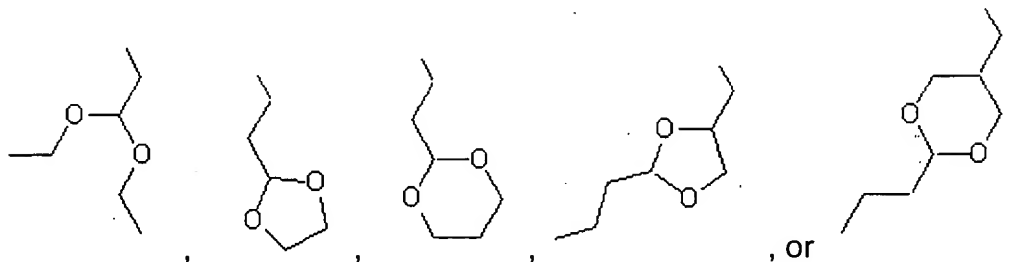
n represents the degree of polymerization of each polymer, and has a value of at least 2.

4. The polymer for a chemically amplified negative photoresist according to claim 3 wherein:

R<sub>1</sub> is H;

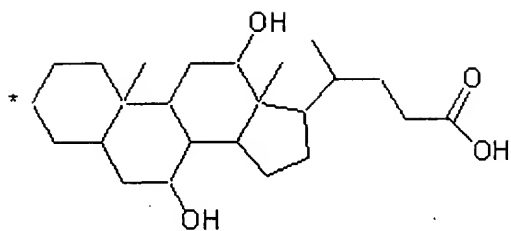
R<sub>2</sub> is CO<sub>2</sub>;

R<sub>3</sub> is



R<sub>4</sub> is CO<sub>2</sub>;

R<sub>5</sub> is



R<sub>14</sub> is CO<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>,

R<sub>15</sub> is OH,

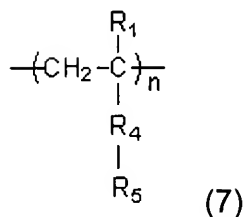
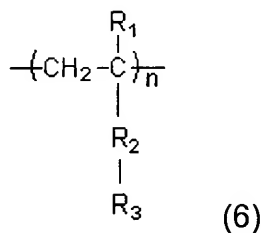
R<sub>16</sub> is a single bond, and

R<sub>17</sub> is COOH.

5. A chemically amplified negative photoresist composition comprising:

a photoacid generator; and

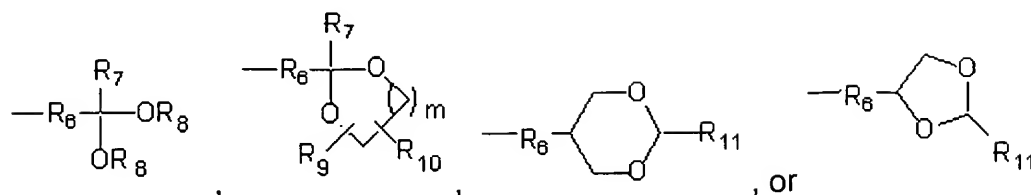
a homopolymer of the formula 6, a homopolymer of the formula 7, or a combination thereof;



wherein R<sub>1</sub> is H or CH<sub>3</sub>;

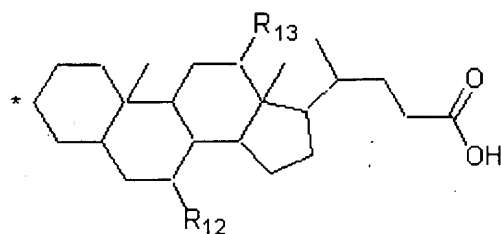
R<sub>2</sub> and R<sub>4</sub> are each independently selected from (R)<sub>α</sub>(CH<sub>2</sub>)<sub>β</sub>R' and (R)<sub>α</sub>[(CH<sub>2</sub>)<sub>γ</sub>O]<sub>δ</sub>R' (wherein R is CO, CO<sub>2</sub>, O, OCO, or OCO<sub>2</sub>, R' is O, CO<sub>2</sub>, or OCO<sub>2</sub>, α is 0 or 1, β is 0 to 5, γ is 1 or 2, and δ is 1 to 5);

R<sub>3</sub> is represented by one of the formula:



wherein R<sub>6</sub>, which combines an acetal compound and a vinyl compound, is a C<sub>1</sub>-C<sub>5</sub> saturated alkyl, a C<sub>1</sub>-C<sub>5</sub> ether, or a C<sub>1</sub>-C<sub>5</sub> carbonyl; R<sub>7</sub> to R<sub>11</sub> are each independently selected from H, C<sub>1</sub>-C<sub>5</sub> saturated alkyls, C<sub>1</sub>-C<sub>5</sub> ethers, C<sub>1</sub>-C<sub>5</sub> carbonyl groups, and C<sub>1</sub>-C<sub>5</sub> alcohol groups; and m is a number ranging from 1-5; and

R<sub>5</sub> is represented by the formula:



wherein R<sub>12</sub> and R<sub>13</sub> are each independently H or OH;

\* represents the bonding site at which the R<sub>4</sub> group is bonded; and

n represents the degree of polymerization of each polymer, and has a value of at least 2.

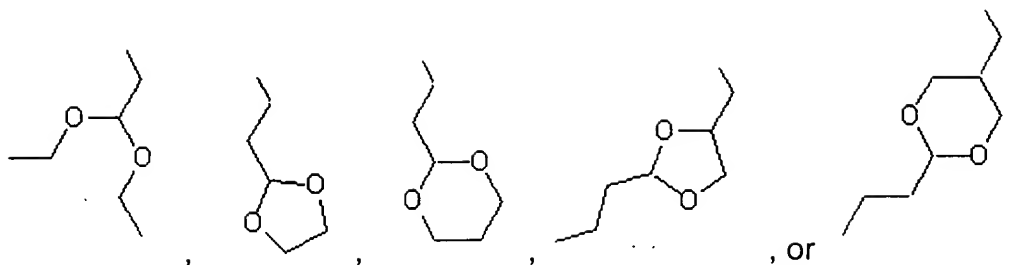
6. The chemically amplified negative photoresist composition according to claim 5 wherein the photoresist composition comprises a combination of the homopolymer of the formula 6 and the homopolymer of the formula 7.

7. The composition for a chemically amplified negative photoresist according to claim 5 wherein:

R<sub>1</sub> is H;

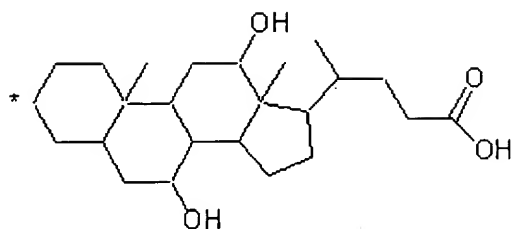
R<sub>2</sub> is CO<sub>2</sub>;

R<sub>3</sub> is



R<sub>4</sub> is CO<sub>2</sub>;

R<sub>5</sub> is



R<sub>14</sub> is CO<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>,

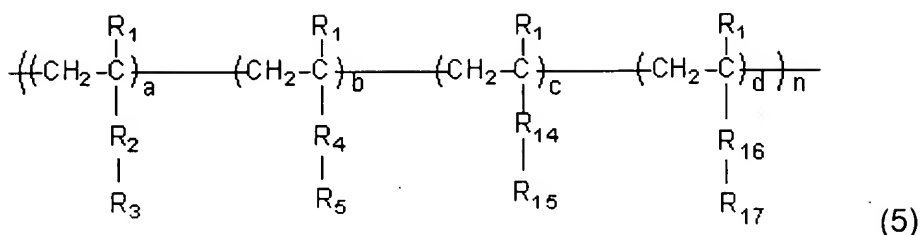
R<sub>15</sub> is OH,

R<sub>16</sub> is a single bond, and

R<sub>17</sub> is COOH.

8. The chemically amplified negative photoresist composition according to claim 5 wherein the photoresist composition comprises 10 to 20 wt.% of the polymer and 0.1 to 1.0 wt.% of the photoacid generator based on the weight of the photoresist.

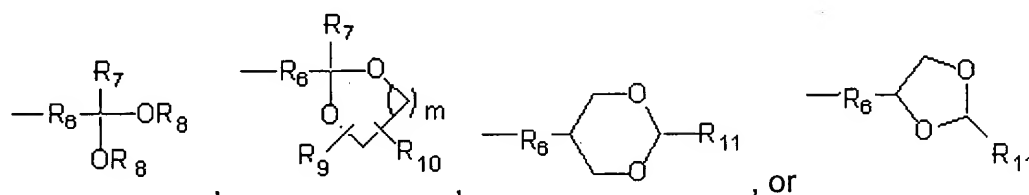
9. A chemically amplified negative photoresist composition comprising;  
a photoacid generator; and  
a polymer of formula 5:



wherein  $R_1$  is H or  $CH_3$ ;

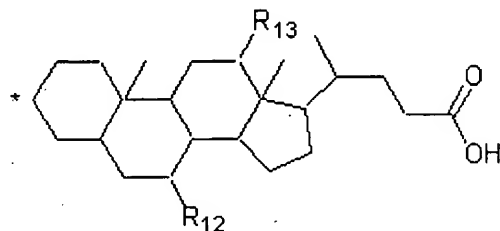
$R_2$  and  $R_4$  are each independently selected from  $(R)_\alpha(CH_2)_\beta R'$  and  $(R)_\alpha[(CH_2)_\gamma O]_\delta R'$  (wherein,  $R$  is CO, CO<sub>2</sub>, O, OCO, or OCO<sub>2</sub>,  $R'$  is O, CO<sub>2</sub>, or OCO<sub>2</sub>,  $\alpha$  is 0 or 1,  $\beta$  is 0 to 5,  $\gamma$  is 1 or 2, and  $\delta$  is 1 to 5);

R<sub>3</sub> is represented by one of the formula:



wherein R<sub>6</sub>, which combines an acetal compound and a vinyl compound, is a C<sub>1</sub>-C<sub>5</sub> saturated alkyl, a C<sub>1</sub>-C<sub>5</sub> ether, or a C<sub>1</sub>-C<sub>5</sub> carbonyl; R<sub>7</sub> to R<sub>11</sub> are each independently selected from H, C<sub>1</sub>-C<sub>5</sub> saturated alkyls, C<sub>1</sub>-C<sub>5</sub> ethers, C<sub>1</sub>-C<sub>5</sub> carbonyl groups, and C<sub>1</sub>-C<sub>5</sub> alcohol groups; and m is a number ranging from 1-5; and

$R_5$  is represented by the formula:



wherein R<sub>12</sub> and R<sub>13</sub> are each independently H or OH; and

\* represents the bonding site at which the R<sub>4</sub> group is bonded;



R<sub>14</sub> and R<sub>16</sub> are each independently selected from a single bond, (R)<sub>α</sub>(CH<sub>2</sub>)<sub>β</sub>R', and (R)<sub>α</sub>[(CH<sub>2</sub>)<sub>γ</sub> O]<sub>δ</sub>R' (wherein R is CO, CO<sub>2</sub>, O, OCO, or OCO<sub>2</sub>, R' is O, CO<sub>2</sub>, or OCO<sub>2</sub>, α is 0 or 1, β is 0 to 5, γ is 1 or 2, and δ is 1 to 5); R<sub>15</sub> is a hydroxyl group; R<sub>17</sub> is a carboxyl group;

a, b, c, and d represent the mole ratios of each monomer, wherein a has a value of 0-0.5, b has a value of 0-0.9, c has a value of 0-0.3, and d has a value of 0-0.3, provided that a+b+c+d = 1; and

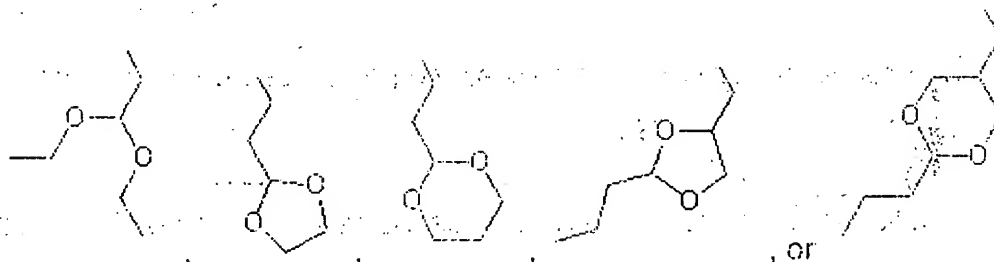
n represents the degree of polymerization of each polymer and has a value of at least 2.

The chemically amplified negative photoresist composition according to claim 9 wherein

R<sub>1</sub> is H;

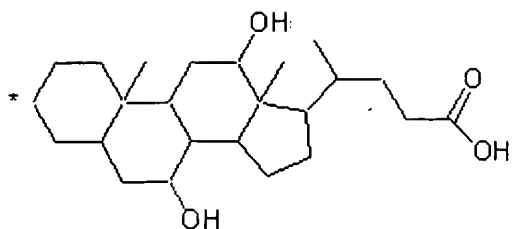
R<sub>2</sub> is CO<sub>2</sub>;

R<sub>3</sub> is



R<sub>4</sub> is CO<sub>2</sub>;

R<sub>5</sub> is



R<sub>14</sub> is CO<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>,

R<sub>15</sub> is OH,

R<sub>16</sub> is a single bond, and

R<sub>17</sub> is COOH.

11. The chemically amplified negative photoresist composition according to claim 9 wherein the photoresist composition comprises 10 to 20 wt.% of said polymer and 0.1 to 1.0 wt.% of said photoacid generator.